Transportation Center Seminar Series presents.....

Marshall Lindsey
Transportation Center Dissertation Year Fellow
PhD Candidate, Chemical & Biological Engineering
McCormick School of Engineering & Applied Science
Northwestern University

Location, Vehicle Miles of Travel, and the Environment: A Chicago Case Study

Thursday – Oct. 21, 2010
4:00 - 5:00 pm
Refreshments available at 3:30 pm
Location:
Transportation Center
Chambers Hall - Ruan Conference Center – Lower Level
600 Foster St., Evanston

Abstract
Reduction of greenhouse gas emissions from personal vehicles, accountable for 62% of U.S. transportation emissions, requires strategies sensitive to the relationship between drivers and urban spaces. This research explores the hypothesis that urban location significantly impacts this relationship by analyzing recent vehicle miles of travel (VMT) data from a Chicago household travel survey. The goal is to better understand this relationship to potentially inform policy to reduce driving.

First, regional household data was aggregated to probe spatial profiles of VMT, energy consumption, and greenhouse gas emissions for interesting patterns. Scenarios tests for reducing driving/emissions included calculating savings from fleet substitution and application of future fuel economy standards. The feasibility of shifting drivers to train for work commutes considering proximity of households and work destinations to rail stations was also tested. Finally, market segmentation techniques and canonical correspondence analysis (CCA) were used to investigate household heterogeneity and suburban driving, respectively, as they relate to the local impact of demographic, urban-form, and employment variables. Both statistical techniques have been previously unapplied to VMT analysis.

VMT on the city’s fringe exceeded that of the city center; higher fringe energy consumption/emission values resulted from extensive driving and low-efficiency vehicle use. Scenario tests revealed possible consumption/emission savings of up to 48% from application of future European fuel economy standards. Up to 71% of the work trips originating from homes within 1 mile of stations also terminated at destinations within 1 mile, 61% of these being automobile trips, signaling potential candidacy for mode shift. Shifting these trips could reduce all energy associated with driven work commutes by 24%. Market segmentation revealed that Chicago’s North side was associated with higher residential density and less driving than the South side, which had greater household distances from rail stations and more employment. CCA linked suburbs with various driving magnitudes (low to high) and the variables types most influential to driving by suburb. Also, extreme low and high VMT was correlated with urban-form variables and moderate driving with demographics. Thesis results reveal the impact of location on driving, potentially yielding more effective, targeted policy development for reducing automobile use.

Bio: Marshall Lindsey has a BS in Chemical Engineering from Case Western Reserve University, an MBA and a MS in Chemical Engineering from Carnegie Mellon University, and is finishing his doctorate in Chemical and Biological Engineering at Northwestern University. His research interests are primarily environmental: for his MS thesis work he studied how polymerized surfactants could be used to clean water, and in his doctoral work, he studies the energy consumption and greenhouse gas emissions associated with transportation in Chicago. In addition to his academic pursuits, Marshall has spent a total of almost 3 years working for BP via several co-ops and internships. These opportunities with BP allowed him to work in Illinois, Indiana, Scotland, and the Netherlands, covering environmental issues in refining, site remediation, and business development.